

(12) UK Patent Application (19) GB (11) 2 307 425 (13) A

(43) Date of A Publication 28.05.1997

(21) Application No 9523919.0

(22) Date of Filing 23.11.1995

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(51) INT CL⁶

B01D 46/00 // B01D 39/00, F24F 3/16 13/28

(52) UK CL (Edition O)

B1T TCFA

(56) Documents Cited

GB 2300368 A

(58) Field of Search

UK CL (Edition O) B1T TCFA TNBA TNRU TPPB

INT CL⁶ F24F 3/16 13/28

WPI

(54) **Filter assembly with biocide**

(57) A filter assembly comprises primary and secondary filters, the secondary filter being treated with a biocide and of a lower filtering efficiency than the primary. The primary filter is preferably glass fibre paper or matt, while the secondary is preferably non-woven polyester impregnated with the biocide. The filtering materials may be bonded together, and then co-pleated. A carbon containing substrate may be incorporated on the side of the primary filter remote from the secondary filter.

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FILTER ASSEMBLY

The present invention relates to a filter intended particularly but not exclusively for use in an air-conditioning system of a building.

Filters for use in building air conditioning are typically made from filtering media comprised of glass fibre matt, synthetic fibre matt or glass fibre paper. Filters of glass fibre matt or synthetic fibre matt are generally configured as either flat pads, as bag or pocket filters, or pleated. Glass fibre paper is generally always pleated to give a high surface area. In all cases the air conditioning filter will become biologically contaminated in use. The contamination usually takes the form of mould, fungus and bacterial growth and is particularly evident on the influent ("dirty") side of the filter. Depending on the efficiency of the filter this biological contamination can be distributed throughout the building and recent investigations have suggested that this may be a contributory factor in "sick building syndrome".

The use of higher efficiency glass fibre paper filters reduces the transmission of biological contamination but does not remove it completely.

In order to prevent biological contamination of the filter media, a biocide can be used to treat the surface. However, in practice this often results in an increase in air resistance, either immediately on application of the biocide or during use.

It is therefore an object of the invention to obviate or mitigate the above-mentioned disadvantage.

According to the present invention there is provided a filter assembly comprising a primary filter and a secondary filter of lower filtering efficiency than the primary filter wherein the secondary filter is treated with a biocide.

The filter assembly is particularly useful for use in air conditioning systems. In use the secondary filter will be located on the influent side of the primary filter.

The secondary filter serves to provide a biocidal treatment to the air being filtered before it reaches the primary filter (which provides the significant part of the filtering capacity of the assembly). Therefore mould, fungal and bacterial growth on the influent side (and consequential blockage) of the primary filter is avoided. The secondary filter also provides additional filtering capacity for the assembly (as compared to that provided by the primary filter alone).

The primary filter is preferably a pleated filter. The pleats of the primary filter are preferably set apart to allow air to flow across all the filtering media

The spacing can be achieved using separate corrugated spaces, e.g. card or aluminium or by use of ribs of hot melt adhesive. It is however preferred that the spacer on one side (the influent side) is provided by the secondary filter.

The primary filter is preferably glass fibre paper but could alternatively be a glass fibre matt or synthetic fibre matt.

The secondary filter may be a non-woven material, most preferably of polyester. The secondary filter preferably has a thickness of 1 to 6mm, more preferably 1 to 3mm.

If the filter assembly is to be used where the removal of noxious gases and vapours at low concentration is required, the assembly may incorporate a carbon containing substrate, e.g. charcoal cloth, charcoal paper, charcoal impregnated form or any other media which

absorbs gases and vapours. The carbon containing substrate is for preference provided on the side of the primary filter remote from the secondary filter.

A preferred filter assembly in accordance with the invention comprises a copleated assembly of a glass fibre paper and a non-woven polyester matt treated with a biocide. Such an assembly is preferably produced by bonding the polyester matt to the glass fibre paper by means of a suitable adhesive, e.g. a hot melt glue, water based PVA or latex. This composite media is then treated so as to impregnate the polyester matt with a biocide. The biocide composite media may then be pleated. If desired the copleated assembly may incorporate a carbon containing substrate for adsorption of gases and vapours. Alternatively or additionally two or more layers of biocide treated polyester matt may be incorporated in the filter assembly. In this case, the layers of biocide treated polyester matt may be on the same side as, or on either side of, the primary filter.

The biocide for use in filter assemblies in accordance with the criteria may for example be Bacterigard FS as supplied by Liquid Technology Ltd.

CLAIMS

1. A filter assembly comprising a primary filter and a secondary filter of lower filtering efficiency than the primary filter wherein the secondary filter is treated with a biocide.
2. A filter assembly as claimed in claim 1 wherein the primary filter is glass fibre paper.
3. A filter assembly as claimed in claim 2 wherein the glass fibre paper is copleated with the secondary filter.
4. A filter assembly as claimed in any one of claims 1 to 3 wherein the secondary filter is a non-woven material.
5. A filter assembly as claimed in claim 4 wherein the secondary filter is of polyester.
6. A filter assembly as claimed in any one of claims 1 to 5 wherein the secondary filter has a thickness of 1 to 6mm.
7. A filter assembly as claimed in claim 6 wherein the secondary filter has a thickness of 1 to 3mm.
8. A filter assembly as claimed in any one of claims 1 to 7 further comprising a carbon containing substrate.

9. A filter containing assembly as claimed in claim 8 wherein the carbon containing substrate is provided on the side of the primary filter remote from the secondary filter.
10. A filter assembly comprising a glass fibre paper copleated with a polyester matt treated with a biocide, the polyester matt being of lower filtering efficiency than the glass fibre paper.
11. A method of producing a filter assembly as claimed in claim 10 comprising the bonding of the polyester matt to the glass fibre paper to produce a composite media, treating the composite media so as to impregnate the polyester matt with a biocide, and then pleating the biocide treated composite media.



The Patent Office

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Application No: GB 9523919.0
Claims searched: 1-11

Examiner: Peter Emerson
Date of search: 12 February 1997

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): B1T TCFA, TNBA, TNRU, TPPB

Int CI (Ed.6): F24F 3/16, 13/28

Other: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2300368 A (SUNTORY) - See page 22, lines 1-5, page 23 line 21 to page 24 line 1, fig 5.	1, 4, 5

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.